TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT

CHARACTERIZATION OF BUILDINGS 324 AND 327

Identification No.: RL-DD05
Date: November 2001

Program: 300 Area Facility Transition
OPS Office/Site: Richland Operations Office/Hanford
PBS No.: RL-RC06
Waste Stream: Mixtures of contaminated and non-contaminated equipment and materials from within hot cells and supporting systems. The material and equipment may include radioactive/mixed wastes, hot cell equipment, ventilation equipment, tanks, pipes, cell construction materials, etc.
TSD Title: N/A
Operable Unit (if applicable): N/A.
Waste Management Unit (if applicable): N/A.
Facility: Buildings 324 and 327

Priority Rating:

This entry addresses the "Accelerated Cleanup: Paths to Closure (ACPC)" priority:

____ 1. Critical to the success of the ACPC.
_X_ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high life-cycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays).
____ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

Need Title: Characterization of Buildings 324 and 327

Need/Opportunity Category: *Technology Opportunity* -- The Site desires alternatives to the current or planned baseline technology/process (e.g., a baseline technology exists but can be improved).

Need Description: Characterization technologies are needed for real-time or near real-time, in-situ determination of contamination levels. Differentiation between TRU waste and (non-TRU) waste is a primary concern. In addition, a verifiable method for determining that materials, components and equipment qualify for free release, or are sufficiently decontaminated to support deactivation end-point criteria is necessary.

Schedule Requirements:

Earliest Date Required: (01/2002)

Latest Date Required: (09/2007)

Problem Description:

a) **Ducts/Piping -** In situ characterization techniques are needed for assessing contamination within ducts and piping. In many instances, the ducts and piping are highly contaminated and may have in-line obstructions. Access also presents challenges due to small diameters, tees, ells and combined vertical/horizontal runs.

b) **Remote Radiation Mapping -** It is difficult to determine where contamination hot spots are in high radiation areas (radiation levels on the order of 2,000-5,000 R/hr in hot cells and ducting). A method that would provide point-specific information is desired to optimize decontamination resources. Current methods for obtaining these data are labor intensive, long in duration, wasteful of personnel occupational radiation exposure, expensive, and subject to a variety of random and systematic errors caused by the use of multiple performers taking repetitive measurements over rather extended time periods.

c) **Segregation techniques** – Techniques are needed that can differentiate between radioactively contaminated and uncontaminated equipment and materials. Potentially contaminated surfaces are often inaccessible to current detection methods. Some materials are managed in their entirety as radioactive and/or mixed wastes, which add unnecessary costs for handling and disposal.

d) **Verification** - To ensure Facility Endpoint Criteria are satisfied, measurement of remaining contamination must be quantified. It is difficult to provide accurate, verifiable data when large areas/equipment is involved.

Potential Life-Cycle Cost Savings of Need (in $000s) and Cost Savings Explanation: ROM LCCS are conservatively estimated at $300K for near-term characterization tasks. This is based on an assumed characterization budget of $500K for six years, and a 10% improvement in efficiency. Also, cost savings during long-term surveillance and maintenance may be realized by confidently mapping radiological areas at the end of deactivation. Cost savings should also be realized from improved segregation techniques and from less conservative waste packaging and disposal requirements; assignment of specific cost savings values for these aspects would be speculative at this time.

Benefit to the Project Baseline of Filling Need: Benefits realized by the Projects should include characterization task efficiencies/schedule reduction, waste volume/class reduction and the reduction in associated disposal costs. Dose reduction and ALARA-based improvements should also be realized.

Relevant PBS Milestones:

TRP-06-921	324 Deactivation Complete	September 22, 2006
TRP-07-930	327 Deactivation Complete	September 7, 2007

Functional Performance Requirements: A method is needed that will allow for real-time differentiation between TRU and non-TRU waste, between low-level waste and free-release waste and/or provide quantitative assessment of remaining contamination. Characterization is required for a variety of configurations including walls, ceilings, equipment, hot cells, and hot cell support equipment.

a) **Ducts/Piping -** Improvements are needed for the remote, in situ characterization of contamination levels in ducts and piping. Ductwork may have obstructions and limited access. Contaminants include cesium, strontium, uranium, and transuranics. The technology would need to be adaptable to a variety of configurations.

b) **Remote Radiation Mapping** - Remotely deployable radiation mapping techniques are required. Methods should permit the identification of hot spots within an area containing high radiation levels.

c) **Segregation Techniques** - Techniques are needed that can differentiate between contaminated and non-contaminated material, and for equipment that has inaccessible surfaces. Current technology allows crushed material on the order of 1 inch or less to be segregated through the assay of the material on a conveyor belt. The improved technology should permit the real-time characterization of materials larger than crushed materials.

d) **Verification** – Facility Endpoint Criteria limit the amount of contamination that can remain in the facility for long-term surveillance. Techniques are needed to provide accurate, verifiable measurement of the remaining contamination on large surfaces and equipment.

***Work Breakdown Structure (WBS) No.*:** 1.04.10, 324/327 Buildings Stabilization/Deactivation

TIP No.: TRP-03-901, Select Technologies for Characterization and Removal of Contaminated Piping, June 27, 2003

Justification for Need:

Technical: Adequate characterization will be used to perform the Final Hazards Analysis prior to completing deactivation end points.

Regulatory: Tri-Party Agreement Milestone M-89-00: Complete Closure of the Non-permitted MW Units of the 324 REC, HLV and LLV by October 2005. The 327 Building contains no TSD units; only the generating facility requirements of RCRA apply.

Environmental Safety and Health: Supports as low as reasonably achievable (ALARA) and radiological mapping for future decontamination and decommissioning (D&D) efforts.

Cultural/Stakeholder Concerns: Reduce employee exposure to toxic and/or radioactive materials. Better characterization data will lead to better and more cost-effective decontamination/removal decisions, thus minimizing quantities of materials handled, stored, or disposed of as a waste product.

Other: None identified.

Current Baseline Technology: Wipes, laboratory samples, radiation detection – both general and energy-specific such as the gamma spectral analyses, document searches, physical walk-through, visual inspections and data recording, hand-held or cart-mounted survey equipment, and ad hoc sampling of representative surfaces, materials, and spaces. Segregation activities involve the use of any of these techniques or material equipment is managed as contaminated.

End-User: EM-60.

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